

J R C T E C H N I C A L R E P O R T S

ECIBC–European Commission Initiative on Breast Cancer

The **ECIBC web hub** concept and feasibility study

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2015



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JRC Science Hub

<https://ec.europa.eu/jrc/>

JRC99626

EUR 27647 EN

ISBN 978-92-79-54175-9 (PDF)

ISBN 978-92-79-54176-6 (print)

ISSN 1831-9424 (online)

ISSN 1018-5593 (print)

doi:10.2788/914579 (online)

doi:10.2788/28463 (print)

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How to cite: Cristiano Gusmeroli, Luciana Neamtiu, Silvia Deandrea, Donata Lerda, Jesús López-Alcalde, Zuleika Saz-Parinson, Aslı Ulutürk; The ECIBC (European Commission Initiative on Breast Cancer) web hub concept and feasibility study; EUR 27647 EN; doi:10.2788/28463.



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Acknowledgements

The authors would like to thank the JRC colleagues Manuel FLORENSA-MOLIST for his editorial support and Silvia BOMBARDONE, Enrico BEN and Giorgia RANDI for reviewing the document.

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ABSTRACT

In December 2012, the Joint Research Centre (JRC) was assigned by the Directorate-General for Health and Consumers (now the Directorate-General for Health and Food Safety – DG SANTE) with the task of coordinating the *European Commission Initiative on Breast Cancer* henceforth shortened to ECIBC.

ECIBC main tasks as defined in the DG SANTE published document¹ are:

- To develop a new version of the *European guidelines for breast cancer screening and diagnosis* based on new knowledge and evidence.
- To develop a voluntary European quality assurance (QA) scheme for breast cancer services covering all care processes based on the EU legislative framework on accreditation² and underpinned by the evidence provided by the guidelines.

With regard to guidelines covering processes other than screening and diagnosis (treatment, rehabilitation and follow-up, and all relevant horizontal aspects), a platform for breast cancer guidelines is envisaged to host existing evidence-based, high-quality guidelines.

The ECIBC project also includes the definition of a concept for training of professionals in breast cancer screening and the development of a dedicated web hub, to which this report refers.

The ECIBC web hub will be the communication interface with stakeholders and the main tool presenting and making available project deliverables (and their updates) over the long-term.

The present report is a summary of the process of developing the concept for the ECIBC web hub and of the feasibility study activities:

1. http://ec.europa.eu/health/major_chronic_diseases/docs/eibc_structure_2014_en.pdf.

2. <http://old.eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:218:0030:0047:EN:PDF>.

- It provides a list of user requirements along with some sketched ECIBC web hub pages, crafted out of a series of meetings and analysing relevant cancer-related web portals.
- It describes the technical platform evaluation process that led to the selection of *Liferay Portal*.
- It presents a high-level initial plan to provide ECIBC web hub functionality needed by the upcoming ECIBC project steps, with a pilot in the second part of 2015 and a fully functional web hub at the end of 2017.

In order to develop the ECIBC web hub, the JRC carried out a specific feasibility study with three main objectives:

- Analyse user requirements.
- Select a technical platform.
- Make an initial time and effort estimation.

1. Introduction

In December 2012, the Joint Research Centre (JRC), which is the European Commission's in-house science service, was assigned by DG SANTE with the tasks of:

- i. Developing the *new European guidelines for breast cancer screening and diagnosis* (hereinafter referred to as *New European Guidelines*).
- ii. Developing a *voluntary European Quality Assurance Scheme for Breast Cancer Services* (hereinafter referred to as *European QA scheme*) based on evidence (guidelines) and underpinned by the European legislative framework on accreditation as defined in Regulation (EC) No 765/2008.³

Those tasks can be summarised, and are presented to stakeholders, as 'the European Commission Initiative on Breast Cancer' (ECIBC).

The ECIBC project also includes:

- iii. The development of a platform for existing high quality guidelines developed by entities external to the EC and covering other processes than screening and diagnosis.
- iv. The development of a concept for digital mammography training directed at health professionals involved in screening programmes. It will include the minimum requirements for professionals working for services adhering to the *European QA scheme*. It will be carried out in coordination with the European key stakeholders and, if successful, the model can be applied to other professional profiles covered by the *European QA scheme*.
- v. The development of a concept proposal outlining the creation of a website for the initiative which should collect and make available all information and tools regarding healthcare quality for breast cancer; it will also be a working platform for the development and updating of the *New European Guidelines* and the *European QA scheme*.

3. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:218:0030:0047:en:PDF>.

vi. The deployment of the website.

For supporting the EC for tasks *i.* and *ii.*, working groups (WGs) have been set up, based on a Call for Expression of Interest for the Guidelines Development Group (GDG) and the Quality Assurance Scheme Development Group (QASDG) organised by DG SANTE, published in October 2014 and concluded with nominations of GDG and QASDG members and reserve lists in July 2015. As regards tasks *iii.* and *iv.*, additional groups may be created under the scientific and technical coordination of the JRC. Tasks *v.* and *vi.* are the object of this report. More details about the project can be found at the JRC webpage Healthcare Quality – JRC Science Hub – European Commission.⁴

As already highlighted in the bullet points above, a website designed for different target users (such as patients, citizens, breast cancer professionals, and researchers) is necessary for supporting the implementation of the ECIBC tasks' results and deliverables. For this reason a feasibility study was conducted taking into account both specific project requirements and general features. This methodology will be adaptable to other projects in the area of healthcare, in order to address the harmonisation needs across present and future initiatives in this field.

This report describes the ECIBC web hub user requirements, the selection of a technical platform to build the ECIBC web hub upon, and a time and effort estimation to implement the ECIBC web hub itself.

The ECIBC website is and will be referred to as the 'ECIBC web hub' due to:

- Its central role for the initiative: supporting the development process, hosting the guidelines, the QA scheme documents and results.
- The diversity of the end-user profiles.

The ECIBC web hub will be the main communication interface with stakeholders and the main tool presenting and making available the project deliverables (and their updates). The ECIBC web hub will be modular and potentially expandable

4. <https://ec.europa.eu/jrc/en/research-topic/healthcare-quality>.

in order to include tools other than those initially foreseen. Its conceptual frame is such to allow replication for other cancers or public health issues.

The aim of this document is to report the methodology and approach applied for the development of a web hub in a new research area for the Joint Research Centre (JRC): cancer. It may serve as a guidance for future similar websites within and outside of the EC.

Chapter 2 describes the methods applied to gather and describe ECIBC web hub requirements (2.1), to select a suitable technical platform (2.2) and to estimate development and maintenance effort (2.3).

Chapter 3 describes the results of the feasibility study: ECIBC web hub requirements analysis (3.3), technical platform selection (3.4), effort estimation (3.5) and project governance (3.6).

Chapter 4 describes feasibility analysis conclusions and ECIBC web hub future developments (4.1).

2. Methods

2.1. General constraints and assumptions

The development of a web hub targeted to different users' profiles is a complex task that requires a thorough preparation to ensure that all stakeholders' needs are taken in consideration. The process of building the concept for the ECIBC web hub started from the results of a limited-distribution JRC report.

The JRC ECIBC project team members and the JRC IT experts had a series of meetings to identify a useful set of contents, to prioritise the development of the many ECIBC web hub components and to plan the timeline of ECIBC tasks execution. As well as these meetings, a series of websites on cancer were analysed to gather additional suggestions on contents.

In the following phase, the JRC team presented the concept of the ECIBC web hub during bilateral meetings with DG SANTE and external stakeholders. Their inputs were incorporated in the concept development. Along with a simple textual description of requirements, several wireframes have been sketched to show what the ECIBC web hub will look like, and to stimulate discussion and feedback provisioning.

Finally, the requirements for the web hub were analysed according to the International Institute of Business Analysis (IIBA)⁵ prescriptions.

The following aspects were taken into account during the concept development phase (they will be further analysed throughout this report):

- User profiles

There are a variety of potential users including health care professionals, patients, and citizens, as well as healthcare managers, quality managers, researchers, academics, policy-makers and others.

5. <http://www.iiba.org>.

- Content

Besides the overview of the initiative, the following sections will be covered:

- *New European guidelines for screening and diagnosis.*
- The *European QA scheme*, including:
 - European platform of recommendations (and guidelines) for those stages of care not included in the *New European guidelines*;
 - information related to the *European QA scheme* (e.g. lists of centres, key performance indicators and their statistics, etc.), which will be available mainly after the hub would have been launched.
- News.
- Training on Digital Mammography.
- Open consultation processes.
- Working groups' needs.

All related tools and relevant information will be linked with these main sections. The inclusion of up-to-date tools and apps is foreseen (e.g. a cross-link to patient associations and modern communication tools like Twitter, Facebook, etc.). Decision aid tools for screening, diagnosis and therapy will be included (when not available, they will be prepared within the project). All final documents developed within ECIBC will be publicly available. However, a restricted area for the GDG and QASDG members will be created for draft documents.

- Language

The initial layout will be in English. However, the possibility of translating at least certain parts in all EU national languages is under evaluation.

- Graphical aspects

The base template for the site will be the standard EC template according to the Information Providers Guide (IPG)⁶ rules.

- Usability

A literature search for best practices and usability and documentation for EC and international rules and standards regarding data protection, accessibility, cookies, and number of possible concomitant users was also carried out. During the deployment process, the team will test its usability.

- Compliance with legal framework regarding:

- Internal EC standards.

6. http://ec.europa.eu/ipg/design/templates/commission/index_en.htm.

- Disability.
- Privacy.
- Standard for trustworthy health information (*e.g.* HON code).
- Versions
Desktop version and mobile/ smart-phone version will be available.
- Updating the content
Once the ECIBC web hub has been completed, the following updates will be on-going:
 - Guidelines, documents and reports.
 - Key performance indicators (KPI).
 - Lists of certified breast cancer services.
 - News.
 - Events.
 - Useful links and training programmes.

The JRC team will perform regular updates of the ECIBC web hub. Users' comments on the ECIBC web hub will be gathered through a specific online form and will be analysed periodically, thereby continuously improving the website and its content. A regular monitoring of statistics will be performed with regards to the number of website visits/hits. Public surveys are planned to assess the satisfaction with the ECIBC web hub.

2.2. Technical platform selection

The methodology used to select the most appropriate technical platform to build the ECIBC web hub is depicted in *Figure 1*.

The main information sources used were:

- Official up-to-date products documentation, found in technical platforms' websites.
- Websites specialised in web portals technical platforms comparison (*e.g.* cms-matrix⁷).

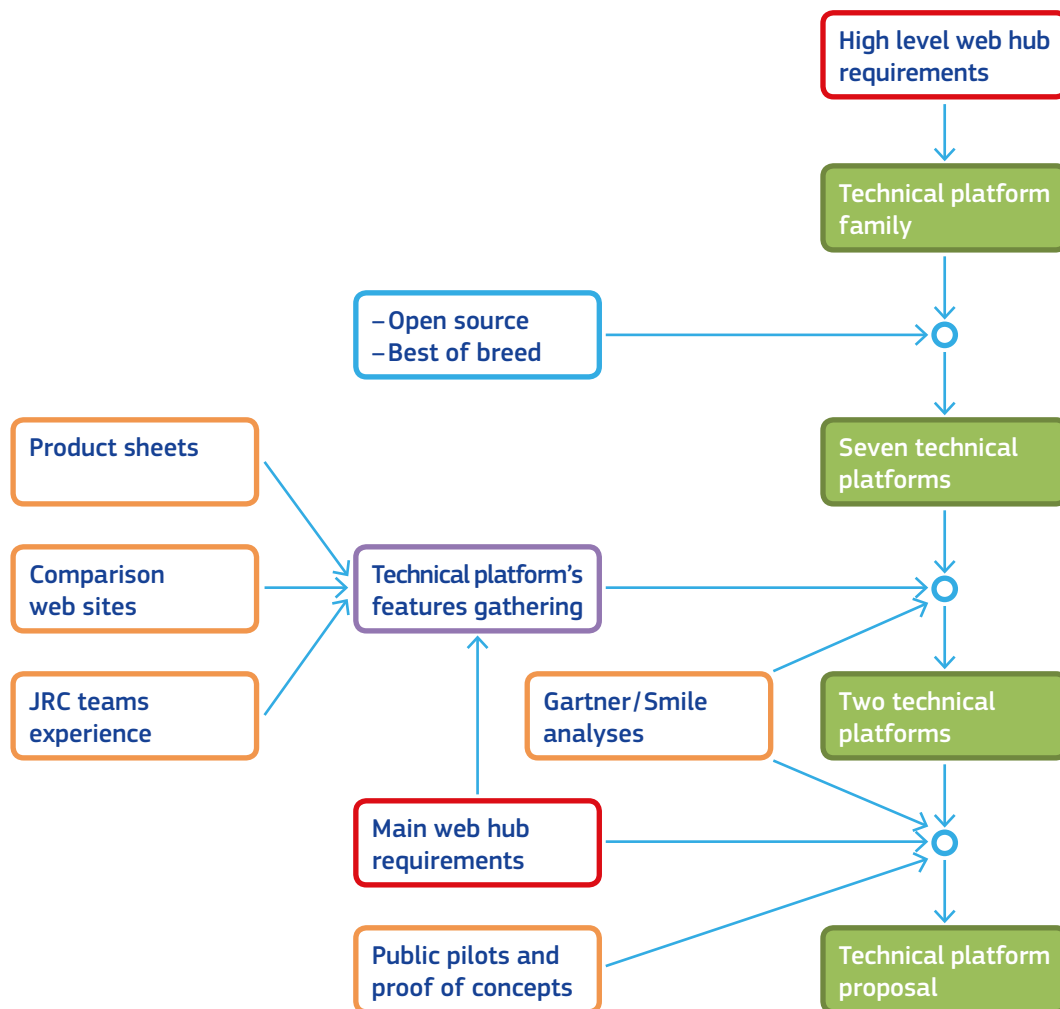
7. <http://www.cmsmatrix.org>.

- JRC team members' experience.

The high level ECIBC web hub requirements were initially analysed to determine the proper family of technical platforms. Once the family was identified, the platforms were selected by applying the two main prioritisation criteria:

- Open source software (OSS).
- Best of breed (*i.e.* products claimed to be the best in the web portals development category based on reputation and widespread usage) available platforms.

Figure 1: *Technical platform selection methodology.*



The main requirements for the ECIBC web hub were analysed and information offered by the seven selected platforms on both the required features as well as those that would be ‘nice to have’ was gathered, leading to the preselection of two technical platforms.

These features, relevant analyses and publicly available pilots for similar web portals were used to finally select the technical platform that will initially be used for a piloting phase.

The activity is described in *paragraph 3.4*.

2.3. Effort estimation

After the requirements were defined and the technical platform selected, a preliminary estimation was carried out to assess the effort needed for the ECIBC web hub development and maintenance using a work breakdown structure (WBS).

The results are described in *paragraph 3.5*.

3. Results

3.1. General constraints and assumptions

The main general assumptions framing the development and maintenance requirements for the ECIBC web hub are listed below.

The ECIBC web hub should be maintained for at least 10 years; resources plans and effort estimation are therefore included in this study.

The data from ‘European Citizens’ digital health literacy–Flash Eurobarometer 404’ report [1], which describes a survey conducted in all 28 EU Member States in September 2014, were used to quantify the potential ECIBC web hub end-users. The aim of the report was to assess the extent to which Europeans already use the internet and online resources to help manage their own health. A majority of respondents (59%) said that they had used the internet to search for health-related information within the last 12 months. Of these, 10% had done so once a week or more, 9% several times a month, 13% approximately once a month, and around a quarter (27%) had used the internet less than once a month to search for health-related information.

Similar analyses for countries other than the 28 EU Member States involved in the ECIBC project are not available; therefore it was decided to apply the same percentages for non-EU countries’ citizens.

The main constraints for the ECIBC web hub project are listed below:

- *Use of open source software:* the EC has a specific strategy as outlined at http://ec.europa.eu/dgs/informatics/oss_tech/index_en.htm. In brief, OSS is the preferred choice and, in any case, used whenever possible.
- *Web accessibility:* as from January 2010, all new EC-related websites should comply with the ‘Web Content Accessibility Guidelines 2.0, level AA’.⁸ Web acces-

8. <http://www.w3.org/TR/WCAG20/>.

sibility aims at enabling all users to have equal access to information and functionalities on the web. More specifically, web accessibility means that people with all abilities and disabilities can perceive, understand, navigate, and interact with the web. According to the UN Convention on the Rights of Persons with Disabilities⁹ signed by the European Union, ‘persons with disabilities include those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others’.

- *Graphical aspects:* the EC has specific rules for institutional websites (Information Providers Guide¹⁰).
- *Technical platform:* the ECIBC web hub must use a well-established platform which will allow JRC to have control of the web portal.
- *Personal data:* European regulations applied to Community institutions and bodies¹¹ will have to be followed:
 - data subjects will be given notice when their data is being collected;
 - data will only be used for the purpose stated and not for any other purposes;
 - data will not be disclosed without the data subject’s consent;
 - collected data will be kept secure from any potential abuses;
 - data subjects will be informed as to who is collecting their data;
 - data subjects will be allowed to access their data and make corrections to any inaccurate data;
 - data subjects will have a method available to them to hold data collectors accountable for not following the above principles.
- *Cookies:* EU legislation covers the following:
 - EU legislation, in particular the ePrivacy directive¹²—more specifically Article 5(3)—requires prior informed consent for storage and for access to information stored on a user’s terminal equipment. In other words, users must be asked if they agree to most cookies before a website starts to use them.

9. <http://www.un.org/disabilities/convention/conventionfull.shtml>.

10. http://ec.europa.eu/ipg/index_en.htm.

11. Regulation (EC) No 45/2001 of the European Parliament and of the Council of 18 December 2000 on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data. Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data.

12. Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications).

- However, some cookies are exempt from this requirement.¹³ Consent is not required if the cookie is:
 - Used for the sole purpose of carrying out the transmission of a communication.
 - Strictly necessary in order for the provider of an information society service to provide its service.

3.2. Target users segmentation

A lot of websites from scientific institutions tend to be tailored to a specific and restricted target audience, normally well informed on the subject treated. Usually, their main focus is information accuracy rather than ease of use.

The ECIBC web hub however should reflect the citizen-oriented character of the ECIBC. At the same time its content and features can interest users with very different health literacy profiles.

The main identified profiles are:

- Patients (and their families and friends).
- Citizens (general public).
- Breast cancer professionals.
- Health managers.
- Policy makers.
- Training professionals.
- Researchers.
- General practitioners.
- Accreditation specialists, quality managers.
- Members of the ECIBC working groups.

The ECIBC web hub, due to its wide audience, must be easy to use and self-explanatory. As transparency is a guiding principle for the whole ECIBC project,

13. Opinion 04/2012 on Cookie Consent Exemption – http://ec.europa.eu/justice/data-protection/article-29/documentation/opinion-recommendation/files/2012/wp194_en.pdf.

it also directly applies to the web hub. Although some web hub contents may be more suitable for a specific target user, it will also be visible to all other users. There will, however, be a restricted access to the working areas for ECIBC WGs members and other specific users.

Initially, the discussion about how to guide different target user's experience accessing the web hub led to envisaging a homepage where the end-user first selects a user category and then tailored content is presented. However, further reasoning brought to the concept that each end-user should be able to see the same content, potentially with different degrees of depth, and should easily be able to access more details if they so wish, based on their specific interests.

While being aware that a personalised entrance may have been appealing for certain user profiles, the choice of having the same homepage entrance for all was further underpinned by the following considerations:

- Most people these days find websites through search engines which would lead them to inner pages rather than the homepage so they would not be able to choose a specific profile from the beginning.
- It will be easier to display and to maintain, since there will be a unique layout for the whole ECIBC web hub rather than different versions for the various tailored pages.
- It is easier to allow everyone, if interested, to access all the material.

3.3. Requirements analysis

3.3.1. Stakeholder requirements

The ECIBC web hub stakeholder high-level requirements were included in a JRC internal report [2] and are summarised in *Table 1*.

Table 1: *Stakeholder requirements.*

Stakeholder	Requirement description
Breast cancer professionals and health managers	<ul style="list-style-type: none"> • <i>European QA scheme</i> • <i>New European Guidelines</i> • Platform of guidelines and respective contact points • Key performance indicators (KPI) • Statistics of KPI anonymised for breast cancer centres benchmarking • Professionals' forum • Computer-assisted clinical decision-making tools • Restricted access area to upload/download data (e.g. key performance indicators)
Policy-makers	<ul style="list-style-type: none"> • Tools for evaluating the impact of implementation of the <i>New European Guidelines</i> and <i>European QA scheme</i> • Best examples and standard operating procedures for development and implementation, organisational problems, specific parts of the process, risks prevention and management, etc. • List of accreditation/certification bodies involved in the <i>European QA scheme</i> • Tools to simulate resources needed to implement the <i>QA scheme</i>
Training professionals and researchers	<ul style="list-style-type: none"> • Proficiency testing services • Biobanks, mammo-banks • Research networks and studies • Training platforms (e.g. e-learning) • Other training needs (e.g. visiting scientists, hands-on training) • Guiding documents • Training programmes
Patients/ Citizens	<ul style="list-style-type: none"> • General values of the <i>European QA scheme</i> • Lists of certified BCSs • Apps and warning messages • Short version of the <i>New European guidelines</i> • Patient decision aids • List of and links to patient associations • Patients' forum
General practitioners	<ul style="list-style-type: none"> • List of certified BCSs and contacts • Patient decision aids • List of contacts • Computer-assisted clinical decision-making tools

Table 1 (cont.)

Stakeholder	Requirement description
Accreditation specialists, quality managers	<ul style="list-style-type: none"> • Manual of the <i>European QA scheme</i> • List of <i>European QA scheme</i> requirements and associated KPI • Guiding documents • NABs contacts for certification bodies • List of useful links (ISO, CEN, relevant technical committees, other schemes, etc.)
All end-users	<ul style="list-style-type: none"> • Search tool • FAQs • Contacts • Latest news • Events • Documents and reports • Clinical guidelines inventory • Useful links • Success stories • List of BCSs (certified/accredited and non-certified/accredited) • Homepage • Public consultations
Working groups and other collaborating teams or individuals (restricted access area)	<ul style="list-style-type: none"> • Organisation and planning of meetings • Documents sharing and editing area • Forum

3.3.2. Solution requirements

ECIBC web hub functional requirements are listed in *Table 2*, while ECIBC web hub non-functional requirements are listed in *Table 3*.

Table 2: *Functional requirements.*

ID	Title	Requirement description
Ro1	Homepage	The web hub homepage will present a single big image (the ECIBC identity image) and evident links to the main sections with a specific image identifying each section. Moreover it will show news and events, along with messages, images and links that will be easily added by the <i>Content Editors</i> of the web hub.
Ro2	Main components used in each page	Each web hub page will have the same design (<i>i.e.</i> colours, fonts, images size), with a common header and footer. It will be possible to add, move or delete pages at any stage of the development and life-cycle of the web hub. The main menu will automatically change accordingly and will be shown in each page.
Ro3	<i>New European Guidelines</i> : structure	The <i>New European Guidelines</i> structure will be based on questions (most of them will be PICO questions) with recommendations (referred to as ' <i>New European Guidelines</i> items'). <i>New European Guidelines</i> items will have a specific structure with title (PICO question), summary, recommendation, background, description, references, associated documents, links and tags. It will be possible to associate these items to a specific target audience, breast cancer stage of care and keywords. <i>New European Guidelines</i> items will be organised in a specific order.
Ro4	<i>New European Guidelines</i> : creation process	<i>New European Guidelines</i> items drafted by the contractor will receive feedback from the GDG, public consultations and DG SANTE. The EC's official services and tools, ECAS, CIRCABC and EUSurvey, will be used. The contractor might use some software tools (<i>e.g.</i> GRADE ¹⁴) to create <i>New European Guidelines</i> items. If these software tools can export objects to a structured file, the web hub will provide administrative functions to import them.
Ro5 .../...	<i>New European Guidelines</i> : browsing and downloading	End-users will be able to read <i>New European Guidelines</i> items, browsing the whole content. A list of <i>New European Guidelines</i> items with minimal information, such as title, simple abstract and link to details will be displayed. End-users will be able to filter <i>New European Guidelines</i> items based on target audience (<i>e.g.</i> only items for patients), breast cancer stage of care (<i>e.g.</i> only items related to the screening stage) or specific keywords (<i>e.g.</i> items related to communication toward patients). .../...

14. <http://www.gradeworkinggroup.org>.

Table 2 (cont.)

ID	Title	Requirement description
.../... Ro5	(cont.) <i>New European Guidelines</i> : browsing and downloading	.../... End-users will be able to download, as a pdf, all the filtered guidelines items.
Ro6	Guidelines Platform	Existing guidelines will be displayed both as a collection of external documents (with basic information such as authors, publication date, link to download, etc.), and as a series of items that will have the same structure as the <i>New European Guidelines</i> items. They will be distinguishable through specific colours or associated icons. Existing guidelines could have any structure (i.e. not based on questions). The process of creating guideline items from existing guidelines will be agreed with GDG and QASDG. Specific calls will be organised to gather relevant guidelines/ recommendations through the web hub. The web hub will provide a tool to manage guidelines' owners/ECIBC coordinators interaction. The approval process will be similar to the one described for <i>New European Guidelines</i> items (i.e. Ro4).
Ro7	<i>New European Guidelines</i> : creation process and display	The <i>European QA scheme</i> guiding documents creation and approval process will involve different stages with comments gathering and final version definition, similar to the process of creating guideline Items. The EC's official services and tools, ECAS, CIRCABC and EUSurvey, will be used. The dedicated JRC team will create or modify <i>European QA scheme</i> material copying and pasting text into the web hub's administration console or uploading documents. This material will be displayed in proper web hub pages as text or documents, which the end-user will be able to browse and download.
Ro8	BCSs awarded with the <i>European QA scheme</i> certificate	The web hub will show certified Breast Cancer Services (BCSs) and provide a proper administration console allowing <i>Content Editors</i> to enter, modify and delete related data (the list of certified BCSs will be maintained by the certification entities). BCSs will be shown on an interactive map. Clicking on an icon will make a pop-up window appear that contains basic BCS information. It will be possible to zoom or centre the map to a precise address and filter BCSs offering specific services. The web hub will also show in a list all the BCSs present in the map, along with all associated information.

Table 2 (cont.)

ID	Title	Requirement description
R09	BCSs in the certification process	The web hub may manage and display BCSs that have started the certification process, distinguishing them from the already certified ones.
R10	KPIs and other quality indicators	<p>Representatives of registered BCSs will be required to subscribe to the web hub via a registration form and their identity will be verified before granting access (off-line process).</p> <p>They will use a specific web hub functionality to provide KPI data (by filling in a form or upload a file); the web hub will perform basic automatic checks (a JRC software to check data files format, written in Java, could be adapted and integrated). They will always be able to modify their provided data.</p> <p>Web hub administrators will be able to manually approve or reject new provided KPI data before they are published or used to automatically update statistics.</p> <p>Statistics on KPI will be evaluated by specific web hub functionality and displayed in a graphical way. The QASDG will support the JRC in selecting KPIs and respective statistics to be made publicly available via the web hub.</p>
R11	<i>European QA scheme applications</i>	<p>BCS representatives will be able to use a series of applications:</p> <ul style="list-style-type: none"> • To help evaluating costs related to guidelines implementation or <i>European QA scheme</i> certification process. • To self-assess the compliance of a BCS with the <i>European QA scheme</i>. • To evaluate their BCS position with respect to other BCSs. And other applications will be developed upon need. <p>The content of these applications will be designed by expert teams, then specific applications will be developed and integrated in the web hub.</p> <p>These applications will consist of a series of questions with multiple choice answers to be chosen by the user, and the immediate results will be displayed.</p>
R12 .../...	Events	<p>It will be possible to manage and display events such as meetings organised by the JRC.</p> <p>The events structure includes: title, start and end date, place, abstract, agenda, details on single agenda items (e.g. speaker, speaker's CV, material), links (e.g. to the JRC's events management tool for registration), documents, photos (that can be seen in a slideshow), etc. .../...</p>

Table 2 (cont.)

ID	Title	Requirement description
.../... R12	(cont.) Events	.../... It will be possible to show a list of events selected by web hub <i>Content Editors</i> , or the complete list, with limited information (e.g. date, place, title, link to details). It will be possible to show an event in detail. <i>Content Editors</i> will be able to associate keywords to events, and web hub end-users will be able to select some filters to create a graph (i.e. spider charts or web charts) representing the occurrence of keywords in events held in a specified period of time.
R13	News	It will be possible to manage news (e.g. latest medical research findings on breast cancer) both from JRC and from other entities. The news structure includes: title, publishing date, description, image, link to the original information. It will be possible to show a list of the latest published news, or the complete list, with limited information (e.g. date, place, title, link to details). It will be possible to show news in detail.
R14	FAQ	It will be possible to enter, modify and delete FAQs that are a single set of questions with related answers (no groups or hierarchy). They will be shown as a list of questions with links to display the answer.
R15	Training programmes	It will be possible to manage training programmes for patients, healthcare managers or healthcare professionals. They will be similar to events, with the ability to show a list of selected training programmes, the archive with all training programmes and the details of each programme.
R16	Forums	The web hub will have the features for creating a series of forums, upon agreement with stakeholders: for patients, for healthcare professionals, for BCS managers, or other interested professionals, to discuss breast cancer and <i>European QA scheme</i> related topics.
R17 .../...	Project support tools	The JRC team and WG members will have restricted areas to share working documents and to upload new/commented versions in the web hub, using a specific functionality that could be implemented, or the EC's CIRCABC tool could be used. Public consultations will be needed for content feedback gathering throughout the project. These may be open to anyone interested, .../...

Table 2 (cont.)

ID	Title	Requirement description
.../... R17	(cont.) Project support tools	.../... or restricted to known end-users. The web hub could provide this functionality, or the EC's EUSurvey tool could be used.
R18	Documents and reports	<i>Content Editors</i> will be able to upload documents (e.g. published documents, related EC/non-EC projects, EU legislation documents) setting access rights. The ECIBC web hub will show lists of documents to download, compatible with specific end-user's rights.
R19	Success stories	Success stories related to 'Centres and the <i>European QA scheme</i> ', 'Centres and the <i>New European Guidelines</i> ' and 'Anniversaries' will be presented in the ECIBC web hub.
R20	Apps	The ECIBC web hub will present a series of existing validated Apps (for smartphones/tablets) in the breast cancer area, providing a link to the proper App stores for downloading. In a future project phase, some content delivered by the ECIBC web hub could be put into one or more Apps. For guidelines, this will mean having the opportunity to browse them when the device is not connected to the internet.
R21	Computer-assisted decision applications	The ECIBC web hub will present computer-assisted decision applications, designed or validated by ECIBC WGs' members, to help healthcare professionals or patients make decisions. It may include risk assessment tools that use validated algorithms to estimate the risk of developing breast cancer in a given period of time based on the presence of given risk factors. These applications will consist of a series of questions with multiple choice answers to be chosen by the user, and the immediate results will be displayed.
R22 .../...	Users Administration, Registration and Log-in	The ECIBC web hub will provide administrators with a console to manage end-users. ECIBC web hub end-users will be able to ask for registration in order to access restricted areas, filling-in a form. If needed, their identity will be verified off-line (e.g. via email or phone). Registered end-users will receive a temporary password to be modified upon first access. End-users with valid credentials will be able to log-in and access restricted areas or functionalities. They will be able to change their password or recover it. .../...

Table 2 (cont.)

ID	Title	Requirement description
.../... R22	(cont.) Users Administration, Registration and Log-in	.../... End-users will be assigned proper roles in order to access specific functionalities. The ECIBC web hub will be integrated with EC's ECAS service for user authentication.
R23	Multi language support	The ECIBC web hub will easily support content localisation in different languages, both for content creation and for content visualisation. Implementation of different languages will be planned according to the available resources.
R24	Further general requirements	<ul style="list-style-type: none"> • Useful links • Search tool: it will be possible to search ECIBC web hub content using keywords • Contacts information • Information about the ECIBC project • Social Networks integration <ul style="list-style-type: none"> ◦ The ECIBC web hub will integrate with social networks such as Facebook, Twitter and LinkedIn, to show latest ECIBC contributions on these social networks. • RSS feeds

Table 3: *Non-functional requirements.*

ID	Title	Requirement description
R100	Search Engine Optimisation (SEO)	SEO rules, according to EC recommendations ¹⁵ will be applied.
R101	Modular approach	<p>The ECIBC web hub will foresee from the beginning all the designed functionalities, using a modular approach, being able to work with or without any of the available modules.</p> <p>Each functionality will be developed and installed as a separate independent module. Obsolete modules will be able to be deactivated/uninstalled without affecting the system, while new and unforeseen modules may be added without major changes to the system. This modularity will be useful not only for technical and testing purposes, but also as an instrument to follow the overall progress in the development of the project.</p>

15. http://ec.europa.eu/ipg/content/optimize/seo/index_en.htm.

Table 3 (cont.)

ID	Title	Requirement description
R102	Easy to modify	The ECIBC web hub will be easy to modify upon feedback and use. If some functions are not found to be useful they may be discarded and new ones may be introduced.
R103	Template for other projects	The ECIBC web hub could serve as a template to be adapted to other projects in the area of healthcare (e.g. other cancers, diseases, etc.) due to its format as well as the methods that have been applied to conceive and develop it.
R104	Navigation experience with different devices	A slightly different version (in terms of content distribution in a page and in terms of fonts and image sizes, but not in terms of functionalities) will be provided depending on the device (PC, tablets, smartphones) used to access the ECIBC web hub.
R105	Usability	As stated in <i>paragraph 3.2</i> , ECIBC patient-centricity and wide target audience, require an easy to use web hub. This is a paradigm shift with respect to the majority of scientific websites implemented at JRC. Easy to use means that each target end-user must be able to understand what the ECIBC web hub is about and use it with minor explanation.

3.3.3. ECIBC web hub wireframes

A website wireframe depicts the page layout or arrangement of the website content. Wireframes help refine user requirements. They will be used to gather feedback from the ECIBC WGs' members and as a basis for detailed visual analysis and components development.

Examples of structures for the ECIBC web hub pages are presented in the following paragraphs. The texts, titles, images, fonts and colours will be agreed at a later stage; thus the ones displayed here do not necessarily represent the final version.

In general all ECIBC web hub pages will be made of a series of components, called portlets, which can be inserted in a specific area of the page and provide a particular functionality. These components are such that they allow ECIBC web

hub administrators to easily and quickly place and remove them from ECIBC web hub pages.

Each main ECIBC web hub area (*e.g.* guidelines, *European QA scheme*, general information about the ECIBC project, etc.) will be associated to an image that represents its visual identity. This should help ECIBC web hub end-users to access what they are looking for in an intuitive and swift way.

3.3.3.1. Homepage

The proposed wireframes for the ECIBC web hub homepage are shown in *Figure 2*, *Figure 3* and *Figure 4* respectively for desktops, tablets and smartphones. The displayed content is similar, but the ECIBC web hub automatically adapts to the device used to access it. On the top of each page, there will be a header with the European Commission logo, links to some general pages such as the one describing the legal notices, the log-in to access restricted areas and the main menu. These are EC requirements, as described in the general constraints in *paragraph 3.1*. The header is simpler for the tablet and smartphone version since the majority of links and the main menu are collapsed (see icon on top right hand corner in *Figure 3* and *Figure 4*).

Then, specific to the homepage, there will be:

- The ECIBC identity image.
- The ECIBC welcome blurb, with a concise explanation of the ECIBC web hub content and purpose.
- Some links with images and titles to access the ECIBC web hub areas to be emphasised (*e.g.* the guidelines, the list of certified BCSs, a page to provide comments and feedbacks on the ECIBC web hub itself, etc.).
- The latest news and events represented by an image, a title, an abstract and a link to details.
- A window open into ECIBC's social media networks profiles (*e.g.* Facebook, LinkedIn, etc.) with latest contributions.
- A graph that summarizes the frequency of keywords covered by ECIBC associated events, with a link to the specific page for more details.

Figure 2: ECIBC web hub wireframe: homepage for desktops.



Figure 3: ECIBC web hub wireframe: homepage for tablets.



Figure 4: ECIBC web hub wireframe: homepage for smartphones.



3.3.3.2. Guidelines

The guidelines section in the ECIBC web hub will contain a series of pages, each with the same section's identity image and a menu to point to the section's sub-pages.

Figure 5 shows a proposal for the main page of the guidelines section.

A description will present the section and some guidelines items, selected by ECIBC web hub *Content Editors*.

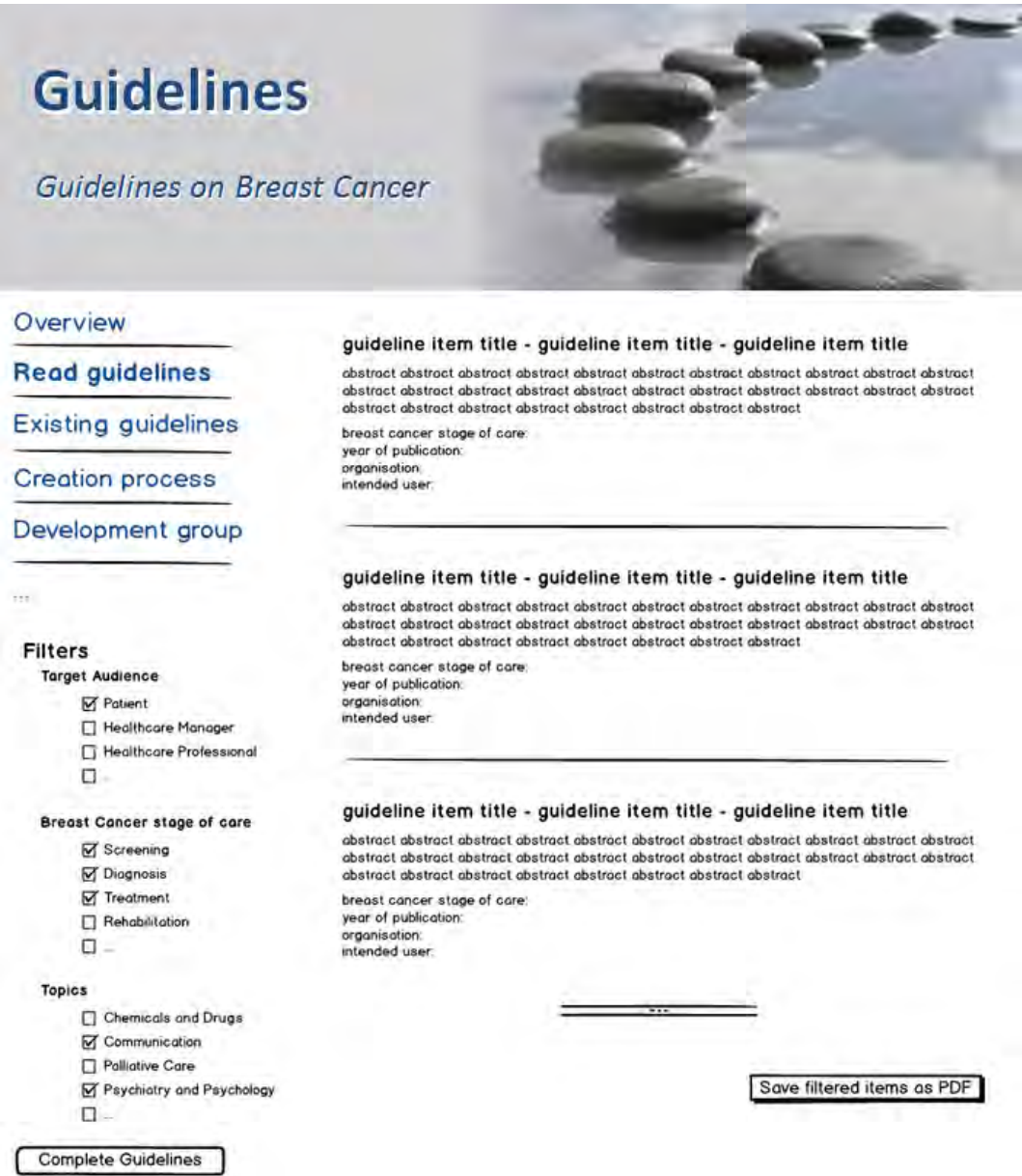
The bottom left area of *Figure 5* shows an image with a link to the call for guidelines submission (refer to *requirement Ro6* in *paragraph 3.3.2*): this element can be added or removed easily by ECIBC web hub *Content Editors* whether the call for such guidelines is open or not.

Figure 6 shows the page where end-users will be able to read a brief description of the guidelines items and apply filters. Each time filters are changed, the related list of items will be updated. The end-users will always be able to download the filtered guidelines items as a pdf file.

In case ECIBC web hub end-users are interested in a specific item of the guidelines, they will click on its title and they will be shown all the details. *Figure 7* shows initial details view, with information more suitable for patients, while *Figure 8* shows more details, such as recommendations references, which can be displayed clicking on the proper section.

[illegible]

Figure 6: ECIBC web hub wireframe: list of filtered guideline items.



[illegible][illegible]

3.3.3.3. European QA scheme – certified BCSs

The *European QA scheme* section in the ECIBC web hub will contain a series of pages, each with the same section's identity image and a menu to point to the section's sub-pages.

Among all the sub-section pages, the one for the certified BCSs is depicted in *Figure 9*.

Each certified BCS will be shown on a dynamic map as a marker. If the end-user clicks on a marker, basic information on that BCS will be displayed. The end-users will be able to zoom in the map or look for a specific place or address (common feature provided by online free map services such as Google Maps).

BCSs will be classified according to the processes of care provided (*e.g.* only screening, only treatment, all, etc.), and the ECIBC web hub end-users will be able to filter the map in order to only show BCSs belonging to specific selected groups.

Finally, the BCSs shown in the map will be listed below it showing also the complete related information.

Figure 9: ECIBC web hub wireframe: European QA scheme – Certified BCSSs.



These wireframes represent the current proposal to implement some of the requirements. Further analysis and feedback gathering will refine both requirements and the visual way to implement them.

3.3.4. ECIBC web hub maintenance

Once the ECIBC web hub is published, its content will have to be continuously updated:

- News, events and training programmes.
- Certified BCS information.
- KPIs.
- Guidelines, documents and reports.
- Guiding documents of the *European QA scheme*.
- Existing guidelines gathering and analysis process.

Updates will have to be performed by the JRC team upon need and using an adequate and easy to use administration console.

Authorised persons from the JRC team will have the role of *Content Editors* or *Content Reviewers*. Namely the *Content Editors* will be in charge of content creation and modification, while *Content Reviewers* will have to approve each piece of content before publication on the ECIBC web hub.

This procedure will enforce consistency, accuracy, and trustworthiness of content, since unauthorized people willing to alter the content will need to hack both *Content Editors* and *Content Reviewers* accounts.

The functionalities which foresee an end-user interaction (*e.g.* forums, comments, request for information, etc.) require a constant monitoring process that will require time and human resources.

Monitoring is needed for many reasons:

- To provide answers to ECIBC web hub end-users when so needed.

- To check ECIBC web hub end-users' contributions before publishing them.
- To analyse public consultation results.
- To keep content and structure consistently aligned to the project and plan updating/outsourcing needs accordingly.

Depending on the topic, different resources will need to be assigned (*e.g.* questions posted in the forum could require specialised medical doctors to provide the proper answers). Moreover, for any restricted area, users needing to register or having any issue with their username and password, must receive timely support by administrators. A monitoring of access statistics will have to be performed on a regular basis.

Finally, ECIBC web hub features will have to be improved and/or changed over time. This also impacts on the maintenance process.

3.4. Technical platform selection

The technical platform selection process started by having to answer a fundamental question: do we need a Web Content Management System¹⁶ (WCMS) or a portal tool¹⁷? In other words, do we have to focus on tools that allow non-techni-

16. A web content management system (WCMS) is a software system that provides website authoring, collaboration, and administration tools designed to allow users with little knowledge of web programming languages or markup languages to create and manage website content with relative ease. A robust Web Content Management System provides the foundation for collaboration, offering users the ability to manage documents and output for multiple author editing and participation. Most systems use a content repository or a database to store page content, metadata, and other information assets that might be needed by the system. A presentation layer (template engine) displays the content to website visitors based on a set of templates. Administration is also typically done through browser-based interfaces. A WCMS allows non-technical users to make changes to a website with little training. A WCMS typically requires a systems administrator and/or a web developer to set up and add features, but it is primarily a website maintenance tool for non-technical staff.

17. A portal tool is a software system to manage web portals. A web portal is most often one specially designed web page that brings information together from diverse sources in a uniform way. Usually, each information source gets its dedicated area on the page for displaying information (a portlet). The extent to which content is displayed in a 'uniform way' may depend on the intended user and the intended purpose, as well as the diversity of the content. Apart from common search engines feature, web portals may offer other services such as e-mail, news, stock quotes, information from databases and even entertainment content. Portals provide a way for enterprises and organisations to provide a consistent look and feel with access control and procedures for multiple applications and databases, which otherwise would have been different web entities. The features available may be restricted to specific authorized and authenticated user (*e.g.* employee, member) or available to anonymous site visitor.

cal users to create and publish web content, or do we have to concentrate on tools that permit an integration of different information sources in web pages?

ECIBC web hub high level requirements were analysed, to discover that features from both types of platforms were needed: the ECIBC web hub is a web portal since it will present heterogeneous content as long as applications are for a specific target audience (*e.g. requirements R10, R11, R21 listed in Table 2*), and at the same time it shows web content to be managed by non-technical staff.

These two domains are actually covered respectively by portal tools and WCMs. In the recent years there is a trend toward convergence (at least in terms of broad features) of portal and WCM demand. Many portal tools have built in some capabilities for managing content. In the same way, many WCMs have built in capabilities for managing website experience.

Typically these technical platforms provide many features that can be used as such (*e.g. calendar, news, events, blogs, etc.*). Moreover, they normally permit to extend the standard features providing tools to develop custom modules. This has fostered an ecosystem of modules produced by private companies and developers that can be purchased and installed upon need.

3.4.1. First step: best of breed open source technical platforms

The first technical platform selection step was the identification of seven tools belonging to the appropriate platform families (*i.e. portal tools and WCMs*), applying two criteria: ‘open source’ and ‘best of breed’ available platforms.

As stated in *chapter 3.1*, the EC is particularly favourable to open source software.

A number of heterogeneous sources were used for this identification: Wikipedia [3], specialised websites and actual JRC team members’ expertise.

Below is the list of all technical platforms that are ‘open source projects’ widely used by commercial and private web portals, with an active community supporting them.

	Drupal ¹⁸ (version 7.36)
	Jahia ¹⁹ (version 7.0.0)
	Joomla! ²⁰ (version 3.4.1)
	Liferay Portal ²¹ (version 6.2 CE GA4)
	Magnolia ²² (version 5.3.7)
	OpenCMS ²³ (version 9.5.1)
	Plone ²⁴ (version 4.3.4)

3.4.2. Second step: technical platforms main features and publicly available analyses

The second stage of the selection process was a broad information gathering. The seven technical platforms were analysed to establish whether and how they were able to cover main ECIBC web hub requirements, either through their provided features, using available third party modules, or via custom software development.

18. <http://www.drupal.org>.

19. <http://www.jahia.com>.

20. <http://www.joomla.org>.

21. <http://www.liferay.com>.

22. <http://www.magnolia-cms.com>.

23. <http://www.opencms.org>.

24. <http://plone.org>.

The data collection confirmed that the seven short listed technical platforms have a high maturity level. As none of them provide all the relevant features for the project, there was no obvious choice, so further analysis was needed.

None of the selected technical platforms can be used to create the ECIBC web hub just via a simple configuration; a certain level of code development would be necessary in all cases (*e.g.* for requirements *Ro8*, *R10*, *R11* listed in *Table 2*). Further research has therefore been carried out, and two studies of interest for our purposes were found:

- The ‘Magic Quadrant for Horizontal Portals’ [4] by Gartner, one of the most rewarded trends and products analysts in the market, issued in October 2014. Three out of the seven short listed technical platforms were covered in that study: *Liferay Portal*, classified as a leader;²⁵ *Drupal* and *Jahia*, classified as niche players.²⁶ It provided an enormous amount of precious insight for the ECIBC web hub technical platform evaluation process.
- The white paper on Enterprise Portal tools [5] by Smile, a French company specialised on open source solutions, published in November 2014. The white paper considers eleven different technical platforms, deeply analysing what they consider to be the three best tools: *Drupal*, *Jahia* and *Liferay Portal*. They were selected by Smile due to their features richness, their technical quality, and their sustainability (*e.g.* community size, number of contributors, etc.). They finally chose *Liferay Portal* as the best platform, mainly due to its flexibility and capability to implement many usage scenarios (*e.g.* intranet with personal spaces, collaborative working groups, social networks, etc.).

Both *Drupal* and *Liferay Portal* are currently used in a number of EC web portals, EC funded web-based projects and health-related websites (references are listed in *Annex*).

25. Leaders are said to score higher on both criteria: the ability to execute and completeness of vision. These are said to be typically larger, mature businesses.

26. Niche players are said to score lower on both criteria: the ability to execute and completeness of vision. *Drupal* entered the ‘Magic Quadrant’ in 2011 as open-source provider that started with a content management proposition and now provides fundamental portal capabilities. *Jahia* has recently emerged as a vendor providing packaged horizontal portal capability.

Taking all of this into consideration, *Drupal* and *Liferay Portal* were chosen for the final evaluation step.

Table 4: *ECIBC web hub requirements coverage by Drupal and Liferay Portal.*

Area	Description	Coverage of web hub requirements
Authentication /authorisation	User segmentation and dedicated content.	Both platforms provide user segmentation and dedicated content.
Structured content /documents	Content must be easily displayed and researched by ECIBC web hub end-users and easily updated by <i>Content Editors</i> . Content is not only simple text, but often structured with proper metadata (e.g. different sections to be displayed in different situations, to different end-users, etc.).	Both platforms provide the ability to easily configure data structures for content.
Integration with ECAS	EC has developed ECAS to manage users' authentication; it will be integrated into the ECIBC web hub.	Both platforms have already been integrated with ECAS for existing EC web portals.
Support to clinical and decision aids applications	At the moment the technology that will be used to develop these applications is not known. These applications will be integrated into the ECIBC web hub.	Depending on specific requirements, both platforms can be configured or extended to integrate these applications. <i>Liferay Portal</i> natively supports standard portlets, so these applications would be developed or wrapped by portlets. <i>Drupal</i> does not support standard portlets, but its features can be extended via custom modules.
Application to manage BCSs	Database + visualisation + research on map + controlled access <ul style="list-style-type: none"> • information on BCSs (e.g. description, location, services provided, contacts, etc.) • position on a map • certifications (<i>European QA scheme</i> certification or others) • KPIs (provided by BCSs managers, statistics) 	This is another ECIBC web hub specific feature, so for the evaluation it is necessary to focus on platforms' tools that help customisation; please refer to the note above.

Table 4 (cont.)

Area	Description	Coverage of web hub requirements
Integration with applications written in Java	Java applications could be integrated into the ECIBC web hub (e.g. the application to automatically check the format of imported files containing KPIs. Requirement R10 listed in Table 2).	<i>Liferay Portal</i> is based on Java programming language, so integration with Java applications is more natural. <i>Drupal</i> is based on PHP, so integration of Java applications requires proper coding with additional effort.
End-users contribution	ECIBC web hub end-users will be able to contribute via a forum, through social networks, sending comments on documents in a public consultation.	Both platforms provide end-users with contribution features.
Working space for WGs	Restricted access area to share documents and comments among specific WGs.	<i>Liferay Portal</i> provides document management features, while <i>Drupal</i> needs additional modules provided by the development community and available on EC version.
Multi-language support	Some areas and content will be written and provided in more than one language.	Both platforms provide multi-language support.
Current usage	JRC will create and maintain the ECIBC web hub for years, so a proper expertise on tools and technologies used must be present or developed properly.	Both platforms are currently used at JRC and at EC level. <i>Drupal</i> is the official WCMS for EC websites. ²⁷
Modular approach	The ECIBC web hub must foresee a modular approach making it possible to implement all the design functionalities at once or over a long period of time. Each feature should be programmed and installed as a separate and independent module.	Both platforms have a modular approach.
Security vulnerabilities support	The technical platform must provide patches to security vulnerabilities	Both platforms have teams dedicated to analyse, solve and provide timely patches for security vulnerabilities.

27. <https://joinup.ec.europa.eu/community/osor/case/ec-consolidates-hundreds-websites-new-drupal-7-europa-platform>.

3.4.3. Third step: publicly available pilots' reports

The selection process continued analysing studies and pilots with similar needs to those of the ECIBC web hub.

- One of the most relevant papers [6] is the description of the portal designed in the European Union funded project 'p-medicine', a web-based 'access point that provides clinicians, patients and researchers a platform to collaborate, share data and expertise, and use tools and services to improve personalised treatments of patients' carried out by the Fraunhofer Institute for Biomedical Engineering IBMT, CUSTODIX and the Universitätsklinikum des Saarlandes. ECIBC web hub and 'p-medicine' projects share similar requirements: the target audience, the information for patients about healthcare related topics, the need to integrate different services/applications.

Liferay Portal was selected as the technical solution of the p-medicine portal.

- The University of East Anglia (UEA), as a result of increasing concerns and issues with their existing web publishing tools, undertook in 2011 a series of technical reviews for delivering web content at UEA [7].

The reviews covered three specific areas that were previously created by different tools: general web content, research websites, and portal.

They decided to address five key areas:

- Improved functionality for users: some bespoke systems they were using were not quick and flexible enough in adopting new emerging technologies.
- Consistency: common branding, marketing, user interface.
- Resilience: the increased complexity of running and maintaining multiple systems increases the possibility of issues arising which might affect availability.
- Flexibility: need to support multiple brands while also enabling cross site searching and navigation.
- Operational costs: different infrastructure and large number of servers required to support the different systems.

The outcome of these various investigations was the identification of an open source product that is able to combine all these areas. A single product to deliver general web content, host the portal and deliver research website. This would have obvious benefits in terms of reducing the management overhead on the systems and UEA dependency on proprietary systems. The product chosen was *Liferay Portal*.

Since then, they have undertaken several pilot projects. The first of these was a set of research websites which would normally have been outsourced or run on their non-resilient server.

- Yale University recently analysed a series of technical platforms for web portals; during a *Liferay* symposium in 2014, Dave DeMichele and Andrew Gruhm presented the results of a proof of concept [8].

They had to build a web hub with the following vision (the ECIBC web hub has similar requirements):

- Build an easy-to-use, contextual, collaborative, inter-connected online experience.
- Focus on centralising tools and technologies (to avoid as much as possible the cost and effort to integrate and maintain different tools and technologies providing different features).
- Theming via HTML & CSS (to implement website visual aspects with HTML and CSS languages).
- Highly configurable and mobile accessible (to reduce as much as possible specific code development and multiple websites implementation depending on the device used to access the content).
- Targeted content by roles (to provide specific content to specific end-users).
- Blogs and forums (to foster end-user's contribution).
- Federated Authentication (to use the same user credentials for different applications, such as ECAS does for EC websites).

They researched technological options that fit these requirements, and determined that a portal framework was desired. The finalists where: *Salesforce*, *Sharepoint*, *Drupal*, *Exo Platform*, *Liferay Portal*.

After further analysis they chose *Drupal* and *Liferay Portal* for a proof of concept lasting six weeks. Expert firms of *Drupal* and *Liferay Portal* tried to implement 62 web hub usage scenarios; the majority of them can be applied to the ECIBC web hub. They finally selected *Liferay Portal*.

3.4.4. Suggested technical platform

Based on the results of the selection process described above, *Liferay Portal* was selected for the ECIBC web hub, using the most recent free-of-charge community edition stable release, version 6.2 CE GA4.

3.5. Effort estimation and project planning

3.5.1. Assumptions

The following list of assumptions was taken into account for the preliminary effort estimation:

- Software development must be carried out by resources with proper skills.
- The requirements taken into account are those described in previous paragraphs. No estimation has been proposed for future requirements, such as the possible alternatives to EC's tools CIRCABC and EUSurvey.
- Additionally, a detailed analysis and design will be carried out before starting coding for all requirements that need clarification or further information. For instance, the precise list of KPIs, valid values for automatic checks and rules to evaluate statistics must be defined before the coding activity can actually start.
- The average number of concurrent users was calculated according to the following:

The number of potentially interested patients/citizens is huge with respect to other profiles (*i.e.* policy makers, managers, medical doctors, etc.), so the estimation was based on a generic citizen profile only.

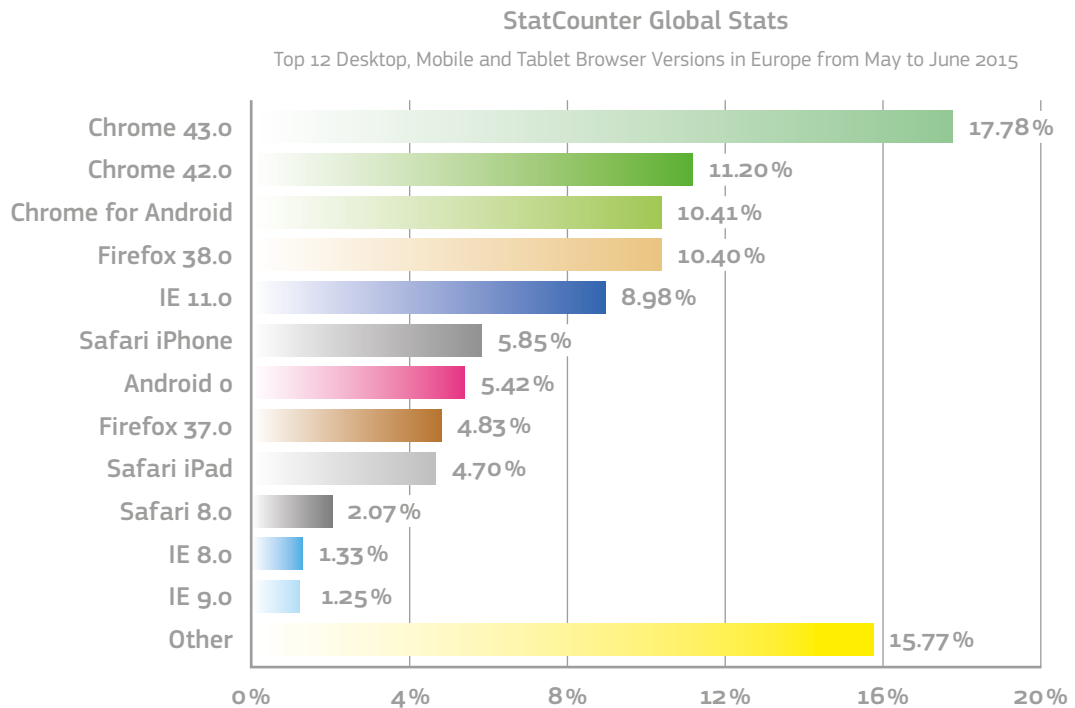
The population of the 28 EU Member States on 1 January 2014 was estimated at 507.4 million according to Eurostat's report [9]. The ECIBC project not only involves these States, but it also involves Iceland, Montenegro, Norway, Serbia, Switzerland and Turkey. These additional countries add roughly 100 million people (estimation based on figures from Wikipedia).

The estimated figures for use of internet and online resources for health topics by Europeans described in *paragraph 4.1* were used, that is 10% of the population search for health-related information four times per month, 9% search twice a month, 13% search once a month and 27% search once in four months. Therefore, 466 million searches per month can be estimated.

If 0.5% of these searches target the ECIBC web hub, it would mean 2.3 million visits per month. This in turns means 78000 visits per day, 5000 visits per hour (excluding some of the night hours), and 80 visits per minute. Assuming the average time on the ECIBC web hub is 5 minutes for each end-user, the average number of concurrent users can be estimated to be 400.

- Development and testing will focus on the most used web browsers, according to the data collected by StatCounter.²⁸ As shown in *Figure 10*, considering only the five most used browsers, more than 50 % of users will be covered.

Figure 10: *Top 12 Desktop, Mobile and Tablet Browser Versions in Europe from May to June 2015.*



3.5.2. Effort estimation

An implementation proposal was sketched for each user requirement in the WBS.

Some requirements could not be fully defined at this report's publication time; therefore the effort estimation was calculated as an average between the easiest solution and the most complex (and expensive) one. Moreover, a 20% deviation, depending on changes that will realistically occur during the development phase, was also considered.

²⁸. <http://gs.statcounter.com>.

Table 5: *ECIBC web hub effort estimation.*

Activity	Estimated effort in man/days
ECIBC web hub user requirements gathering, feasibility analysis and report	60
ECIBC web hub development	280 to 320
ECIBC web hub design and project management	40 to 50
ECIBC web hub testing	50 to 60
ECIBC web hub technical documentation and user guides	20
ECIBC web hub initial deployment and configuration	30
ECIBC web hub content management (refer to <i>paragraph 3.3.4</i>)	Without forum management: 20 (per year) With forum management: add 40 (per year)

The main source to estimate the effort needed were the authors of this report and JRC IT staff's experience with similar web portals.

3.5.3. ECIBC web hub development timeline

The first phase will be a pilot based on *Liferay Portal*. The pilot will focus on the ECIBC web hub features that need minimum development effort (*e.g.* news, events, ECIBC project documents, status and achievements, etc.).

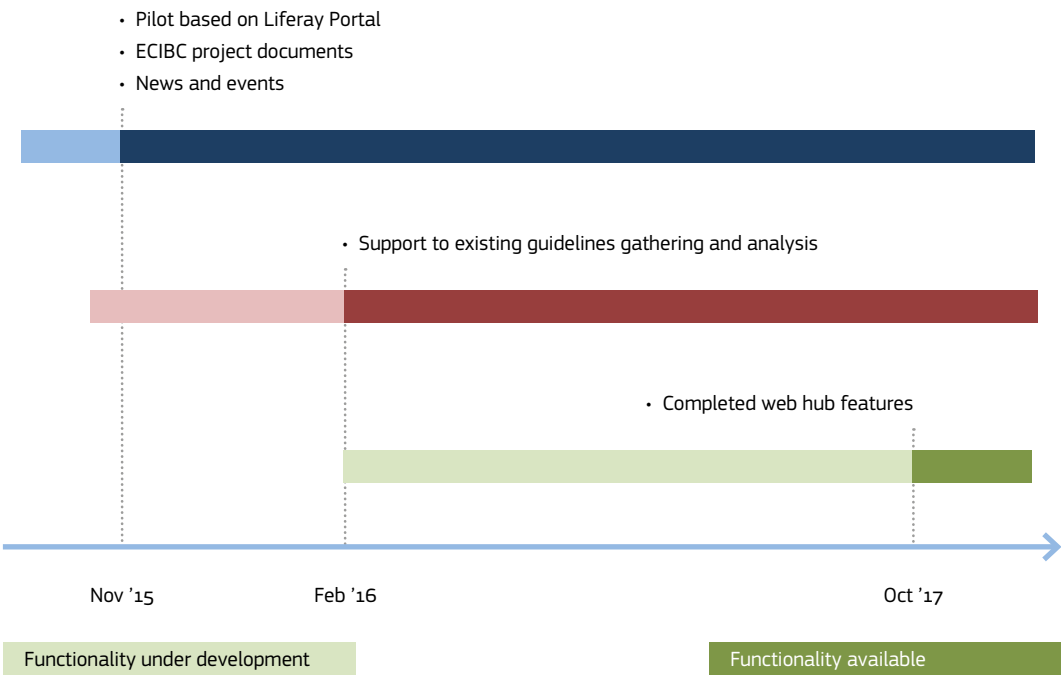
The second phase will provide support for gathering and analysing existing guidelines.

At the final development phase, the ECIBC web hub is expected to give access to all ECIBC project's deliverables and all other planned features will be completely available.

Figure 11 shows a possible high-level plan with the three main phases that are foreseen at the time this report will be published.

A web hub with this content is expected to continuously evolve over time. The development and availability of ECIBC web hub functionalities should always anticipate, with a reasonable amount of time, the content readiness to be published. Therefore, the ECIBC web hub functionalities implementation plan must be strictly tied to the content development plan.

Figure 11: *High-level ECIBC web hub development and deployment plan with main functionalities.*



A more detailed plan with the actual functionalities foreseen during each project iteration step will be developed and communicated as the ECIBC project (and its sub-project, the ECIBC web hub) evolves over time.

3.6. Project governance

3.6.1. Project management methodology: PM2 and Agile

PM² is the official Project Management Methodology of the EC. Its purpose is to enable project managers to deliver solutions through the effective management of project work.

Project management activities cannot always be described solely in terms of strict sequential steps, as they often require an adaptive approach, involving progressive elaboration of plans, incremental development of deliverables, and overlapping management activities. PM² recognizes the complex and uncertain nature of many types of projects and the positive contribution of the agile way of thinking to their effective management.

An agile approach is necessary for the ECIBC web hub given that some specific requirements will realistically evolve over time. As stated before, ECIBC has precise targets but it is open to many contributions and consultations, hence flexibility is a key feature that needs to be reflected in its main interface, the ECIBC web hub.

Scrum [10] is the suggested iterative and incremental agile software development methodology. It has to be pointed out that ‘agile’ doesn’t mean a framework with total freedom and no control; rather a controlled way to adapt to new or modified needs based upon consensus among all involved parties.

Budget and time constraints must and will always be taken into account through:

- Constant monitoring of alignment between available human and financial resources.
- Detailed cost estimation of each feature after detailed analysis.
- Reallocation of budget for any significant requirements modification.

Scrum (refer to *Figure 12*) is based on a series of project iterations called Sprint, each of which should deliver a partial project version with the features listed in the Sprint Backlog. In our case, the development phase will produce a series of

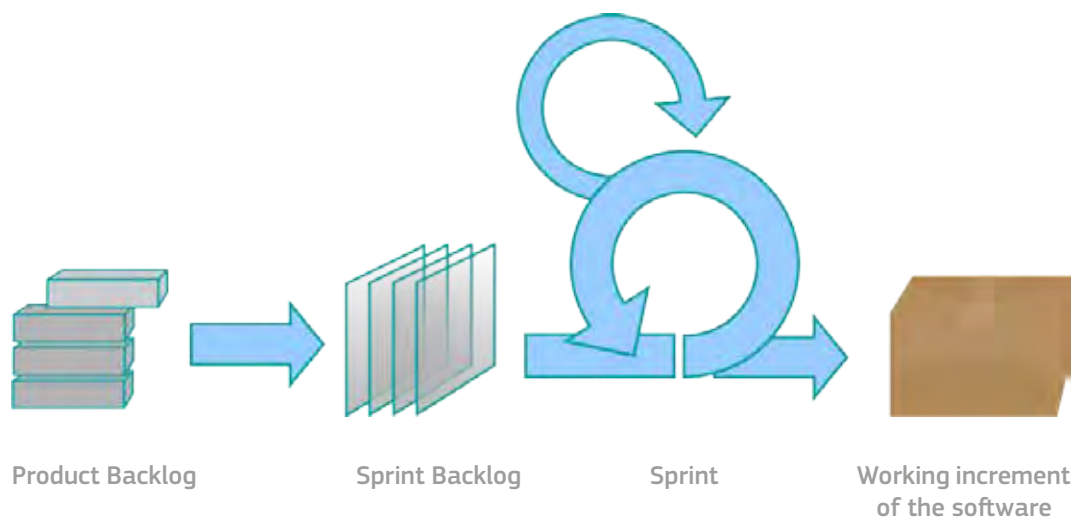
ECIBC web hub versions, each one with increased richness of provided features, which will be shared with all stakeholders in order to get immediate feedback. This will avoid spending months developing a web hub that does not completely meet stakeholders' expectations, or that does not take into account new or modified needs.

After each Sprint, based on feedback gathered and experience gained, the following iteration will be defined in terms of features to be developed.

The result of each Sprint is a potential candidate for the production environment.

Two usability testing sessions will be organised where potential ECIBC web hub users will be asked to perform a series of tasks on the ECIBC web hub. Observing their actions and listening to their thoughts, will provide precious feedback on actual ease of use and hints for improvements.

Figure 12: *Scrum agile software development methodology scheme (source: Wikipedia).*



3.6.2. ECIBC web hub project risk management

Risk management is the identification, assessment, and prioritisation of risks followed by actions to minimise, monitor, and control the probability and/or impact of unfortunate events.

The feasibility study includes identification of the main risks for the ECIBC web hub; the following factors were taken into account:

- Software and web-based projects' uncertainties.
- The number of stakeholders involved in consultations and feedback that cause additional complexity in requirements' management.
- The ECIBC web hub relevance as an EC official website.
- The effects of issues such as poor or outdated content and security related concerns.

Specific actions and policies that must be applied throughout the entire life-cycle of the ECIBC web hub have been identified.

New risks could arise leading perhaps to a need for changes in actions. Therefore, a continuous monitoring and evaluation process must be in place.

Table 6 lists the ECIBC web hub's identified risks, along with past, ongoing and future actions to manage them.

Table 6: *ECIBC web hub identified risks.*

Risks	Actions and policies
Requirements are not clearly defined	<ul style="list-style-type: none"> • A series of meetings were conducted among JRC ECIBC project team members, as well as with JRC IT experts. • A series of bilateral meetings were organised and stakeholders were often asked to provide inputs for the ECIBC web hub. • A series of websites on cancer were analysed, in order to gather suggestions on contents. • A series of ECIBC web hub pages wireframes were sketched, since they are a valuable tool to show what the ECIBC web hub will look like, and to stimulate discussion and feedback provision- ing to better clarify requirements. • Requirements listed in this feasibility study and all wireframes will be shared among involved stakeholders to gather feedback. <p>.../...</p>

Table 6 (cont.)

Risks	Actions and policies
<p>(cont.)</p> <p>Requirements are not clearly defined</p>	<p>.../...</p> <ul style="list-style-type: none"> • In general, the project life-cycle should be flexible enough to promote feedback gathering and to take into account agreed improvements, ensuring the most effective use of resources. • A conservative approach was applied to estimate the resources needed to develop the ECIBC web hub, which will allow the possibility to take into account future inputs from members of GDG and QASDG.
<p>Requirements can change over time</p>	<ul style="list-style-type: none"> • The evolution of project requirements will be considered a design requirement itself; the designed solution will be flexible enough to accommodate reasonable feature changes. • Software development will produce a series of ECIBC web hub versions with augmented features. Each version should ideally be a candidate for the production environment (this means that each ECIBC web hub version must implement some features in a complete way). Moreover each version should be submitted to GDG, QASDG and other stakeholders to gather feedback and new or changed requirements will be agreed and planned for next releases.
<p>Difficult day-by-day maintenance</p>	<ul style="list-style-type: none"> • All <i>Liferay Portal</i> and custom features will have a user-friendly administration interface in order to allow allocation of this task to non-IT resources.
<p>An obscure or niche choice in technology stack could lead to difficulty in finding people to develop the project over time</p>	<ul style="list-style-type: none"> • Adoption of open source and well established technologies and products. • Necessary expertise quite easy to find in the market.
<p>Development team unfamiliar with selected development tool</p>	<ul style="list-style-type: none"> • At least part of the development team will be hired with specific skills on technologies and products used.
<p>Lack of an effective project management methodology and tools</p>	<ul style="list-style-type: none"> • A proper project management methodology will be applied. • Tools already available in Commission IT infrastructure (e.g. Atlassian tools <i>Jira</i> and <i>Confluence</i>) will be used.
<p>Insufficient development concerning security aspects</p>	<ul style="list-style-type: none"> • Native technical platform qualities (e.g. reliability, security, etc.) were seriously considered in the selection process.

Table 6 (cont.)

Risks	Actions and policies
Lack of data privacy and data security aspects	<ul style="list-style-type: none"> • Sensitive data will be managed according to privacy rules. • Access to sensitive data will be limited to allowed resources. • A proper authentication and authorisation system will be implemented.
Intellectual property rights issues	<ul style="list-style-type: none"> • Main ECIBC web hub contents are produced by the ECIBC project itself and owned by the EC. • For all contents presented but not owned by the EC, proper rights will be acquired prior to publication. • Other contents, such as images, will be owned by the EC or free to use.

3.6.3. Dissemination of the ECIBC web hub

Dissemination of the ECIBC web hub will be done according with the general dissemination strategy of the ECIBC. Several communication channels will be used such as internet communication (newsletters, Really Simple Syndication–RSS), events and meetings, networks, and publications.

4. Conclusions

The feasibility analysis was quite a long and challenging journey, with engaging discussions and thought-provoking conversations. It has led to the definition of requirements, the proposal of a technical platform, and to an estimation of the time and effort needed for the ECIBC web hub development and maintenance.

The solution requirements and some page wireframes represent the current ECIBC web hub functionalities, taking into account the best compromise between dream features and down-to-earth content actually useful for the foreseen ECIBC web hub end-users. The proposal will be presented as soon as possible to the ECIBC WGs' members, in order to finalise some still open minor points with their contribution.

The result of the analysis of the technical platforms, described in *paragraph 3.4*, has led the team to suggest *Liferay Portal* as the most appropriate solution for the ECIBC web hub.

The definition of the requirements and selection of the technical platform have provided the information needed to estimate the ECIBC web hub development time and effort, as described in *paragraph 3.5*. A series of ECIBC web hub releases, with added features, will accompany the ECICB evolution until the end of 2017 and after. The estimated development time needed, in man/ days, ranges from 480 to 590, with a 20% possible deviation due to realistic changes that will possibly occur during the development phase.

4.1. Future developments

Some of the user requirements that were initially discussed have been postponed to future project phases as it was considered, at this stage, a priority to focus on core functionalities.

It will be necessary to have a document sharing and collaboration tool in order to carry out ECIBC activities. At the moment, CIRCABC will be used since it is the official EC tool, but the ECIBC WGs needs will be monitored in order to decide whether the ECIBC web hub should provide this functionality with more specific and valuable features than CIRCABC currently has.

A similar approach will be taken with the public consultation tool: EUSurvey will be initially used since it is the official EC tool. Feedback and needs will be collected to eventually develop a specific functionality in the ECIBC web hub.

Moreover, in the future, some content delivered by the ECIBC web hub could be put into proper mobile apps. For instance, creating a mobile app for guidelines will enable users to read them when the device is off-line.

The ECIBC web hub will serve as a template where built components may be adapted in the future to cover features related to other projects in the healthcare area such as other types of cancers or diseases.

Annex: EC or health-related websites based on *Drupal* and *Liferay Portal*

Here is a list of websites, based on *Drupal* and *Liferay Portal*, related to the European Commission or to health topics.

Note: the descriptions were taken from the respective websites.

Table 7: *EC or health-related websites based on Drupal.*

Link	Description
http://ec.europa.eu	The official main EC website.
http://ec.europa.eu/digital-agenda/	Digital for Europe lets you monitor, understand and discuss how the European Commission is reaching its goals related to the Digital Agenda for Europe and the Digital Single Market. You can check what happens, both at the European and international level and in your country. To participate in the discussions, join the Digital Agenda community.
http://europa.eu/youth	The European Youth Portal offers European and national information and opportunities that are of interest to young people who are living, learning and working in Europe. It gives information around eight main themes, covers 33 countries and is available in 27 languages.
http://ec.europa.eu/energy	The Directorate-General for Energy is one of 33 policy-specific departments in the European Commission. It focuses on developing and implementing the EU's energy policy – secure, sustainable, and competitive energy for Europe.
https://ec.europa.eu/programmes/horizon2020	Horizon 2020 is the biggest EU Research and Innovation programme ever with nearly EUR80 billion of funding available over 7 years (2014 to 2020) – in addition to the private investment that this money will attract. It promises more breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market.
http://education.nccn.org	The mission of National Comprehensive Cancer Network's Continuing Education Program is to improve patient outcomes in oncology by educating clinicians on the application of evidence-based .../...

Table 7 (cont.)

Link	Description
(cont.) http://education.nccn.org	.../... medicine. Our accredited educational activities are designed for oncologists (in both community and academic settings), nurses, pharmacists, case managers, and other health care professionals involved in the care of patients with cancer.
http://csn.cancer.org/	American Cancer Society Cancer Survivors Network.
https://www.optumhealtheducation.com	OptumHealth Education is one of only 17 jointly accredited organizations in the world, having been simultaneously accredited to provide medical, nursing, and pharmacy continuing education activities by the ACCME, ANCC, and ACPE.

Table 8: EC and/or health-related websites based on Liferay Portal.

Link	Description
http://ec.europa.eu/eurostat	Eurostat's mission: to be the leading provider of high quality statistics on Europe. Eurostat is the statistical office of the European Union situated in Luxembourg. Its task is to provide the European Union with statistics at European level that enable comparisons between countries and regions.
https://publications.europa.eu/en/home	The Publications Office of the European Union (Publications Office) is an interinstitutional office whose task is to publish the publications of the institutions of the European Union (Decision 2009/496/EC, Euratom). Its core activities include production and dissemination of legal and general publications in a variety of paper and electronic formats, managing a range of websites providing EU citizens, governments and businesses with digital access to official information and data from the EU, including the EU Open Data Portal and EUR-Lex, and ensuring long-term preservation of digital content produced by EU institutions and bodies. The EU law and publications website offers easy access to EU law. In the future, it will expand its services and give the users a single access point to all the publications, EU law and data managed by the Publications Office.

Table 8 (cont.)

Link	Description
http://www.clustercollaboration.eu/	<p>The European Cluster Collaboration Platform (ECCP) provides rich information and services that enable better and more targeted interactions between cluster organisations and their members. ECCP seeks to improve performance and increase competitiveness through the stimulation of European and international cluster cooperation.</p> <p>Inovex GmbH, in cooperation with ZENIT GmbH and Clusterland Upper Austria GmbH, were responsible for the development and implementation of a collaboration platform on behalf of the European Commission.</p> <p>The project, based on <i>Liferay Portal</i>, is described here: http://www.liferay.com/products/liferay-portal/stories/eccp.</p>
http://www.europeana-libraries.eu/	<p>Europeana is a search portal enabling access to the digitised material of around 1500 museums, libraries, and archives in 32 European countries.</p> <p>Europeana is administered by the Europeana Foundation which is housed in the Royal Library in The Hague and receives funding from the European Commission.</p> <p>The project, based on <i>Liferay Portal</i>, is described here: http://www.componence.com/cases/europeana/.</p>
http://www.coe.int/	<p>The Council of Europe is the continent's leading human rights organisation.</p> <p>It includes 47 Member States, 28 of which are members of the European Union.</p> <p>The project, based on <i>Liferay Portal</i>, is described here: http://www.liferay.com/documents/14/8440786/En_Council+of+Europe_WEB.pdf.</p>
https://fishreg.jrc.ec.europa.eu/ https://fishpoptrace.jrc.ec.europa.eu/ https://fishpoptrace.jrc.ec.europa.eu/web/aquagen https://fishpoptrace.jrc.ec.europa.eu/web/fishpoptrace	<p>A series of web portals created and maintained by JRC.</p> <p>FishPopTrace is an international project aiming at the construction of a Pan-European framework, built on advanced technologies, for product traceability and policy related monitoring, control and surveillance (MCS) in the fisheries sector.</p> <p>Pursuing a holistic approach, FishPopTrace can contribute to fisheries management and conservation measures in line with the global attempt to move towards sustainable fisheries.</p>
http://www.promise-noe.eu/home	<p>PROMISE: Participative Research labOratory for Multimedia and Multilingual Information Systems Evaluation. .../...</p>

Table 8 (cont.)

Link	Description
(cont.) http://www.promise-noe.eu/home	PROMISE will provide a virtual laboratory for conducting participative research and experimentation to carry out, advance and bring automation into the evaluation and benchmarking of such complex information systems, by facilitating management and offering access, curation, preservation, re-use, analysis, visualisation, and mining of the collected experimental data. The project, based on <i>Liferay Portal</i> and co-funded by the 7th Framework Program of the European Commission, is described here: http://www.promise-noe.eu/documents/10156/12d881d7-f6fc-427c-be49-b8fe4461440b .
http://www.bcbsalmedicare.com/	Blue Cross and Blue Shield of Alabama provide health care coverage to their members. They have several websites and portals that touch customers, doctors and hospitals (a.k.a. providers), and employer groups throughout the state. In recent years, the health care coverage provider saw advances in web capabilities, including a major shift toward web and mobile technologies, which they wanted to harness to serve their customers. <i>Liferay Portal</i> was chosen as their entire core enterprise portal platform. The project, based on <i>Liferay Portal</i> , is described here: http://www.liferay.com/products/liferay-portal/stories/bcbsal .
http://www.cbi.ca/web/cbi-health-group/map	Health Centre location on map (Canada) based on <i>Liferay Portal</i> and Google Maps.
http://www.dunnsolutions.com/content/web/guest/experience-detail?p_p_id=webcontentadt_WAR_webcontentadtportlet_INSTANCE_5QdXAheQDzxf	A hospital that is part of a healthcare system with locations in twenty-one states was seeking a new way for their patients who visit their Emergency Room to seek medical care. Challenge: audit revealed many ER visits could be successfully replaced with simple medical consultations. Solution: the hospital approved the eVisit portal project, built on the <i>Liferay Enterprise Platform</i> . Result: eVisit portal to reduce costs for patients and insurance providers and provide a more convenient emergency medical visit option.
http://www.aimdek.com/portfolio/healthcare.html	A healthcare start-up in USA with several years of experience working on different areas of healthcare systems. They have developed a system which addresses many important requirements of doctors, patients and government regulations, is feature rich and user friendly.

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List of abbreviations and definitions

BCS	Breast Cancer Service
DB	Database
DBMS	Database Management System
EC	European Commission
ECIBC	European Commission Initiative on Breast Cancer
GDG	Guidelines Development Group
HTTP	HyperText Transfer Protocol
HTTPS	HyperText Transfer Protocol Secure
JRC	Joint Research Centre
KPI	Key Performance Indicator
OSS	Open Source Software
PICO	Patient, problem or population; Intervention; Comparison intervention; Outcomes
QASDG	Quality Assurance Scheme Development Group
SEO	Search Engine Optimisation
UN	United Nations
WBS	Work Breakdown Structure
WGs	Working Groups

Breast cancer care

Any kind of healthcare intervention aimed at preventing, diagnosing or treating breast cancer, including the follow-up of any other condition caused by the disease or the treatment itself. It may include primary prevention when the intervention is specifically targeted to breast cancer (*e.g.* dietary recommendations for high-risk women).

(Source: Concept document – https://ec.europa.eu/jrc/sites/default/files/ecibc_concept_document.pdf)

Breast cancer services

Comprises all services covering, in continuum, the full extent of management of breast cancer, from screening to follow-up and in some cases end-of-life care. These services may involve both primary care and a range of high speciality services including but not limited to screening, diagnostic imaging, pathology, surgery, radiation and medical oncology.

(Source: Concept document – https://ec.europa.eu/jrc/sites/default/files/ecibc_concept_document.pdf)

CIRCABC

CIRCABC stands for Communication and Information Resource Centre for Administrations, Businesses and Citizens. It is a web based service provided by the EC that is used to create collaborative workspaces. It is divided into categories and interest groups, allowing people in those groups to share information and resources.

(Source: <https://circabc.ec.europa.eu/faces/jsp/extension/wai/navigation/container.jsp>)

Cookie

A packet of data sent by an Internet server to a browser, which is returned by the browser each time it subsequently accesses the same server, used to identify the user or track their access to the server.

(Source: www.Oxforddictionaries.com)

Content Editor

Authorised persons in charge of ECIBC web hub content creation and modification.

Content Reviewer

Authorised persons in charge of ECIBC web hub content approval before publication.

Custom software

Custom software (also known as bespoke software or tailor-made software) is software that is specially developed for some specific organisation or user.

Since custom software is developed for a single customer it can accommodate that customer's particular preferences and expectations.

(Source: Wikipedia)

European Commission Authentication Service (ECAS)

ECAS is the EC's user authentication service. It is designed to increase the security of EC IT systems while at the same time reducing the number of times users have to supply a username and password.

(Source: <https://webgate.ec.europa.eu/cas>)

European QA scheme

The voluntary European Quality Assurance scheme for Breast Cancer Services (to be developed within ECIBC under JRC coordination).

(Source: Concept document – https://ec.europa.eu/jrc/sites/default/files/ecibc_concept_document.pdf)

European platform of recommendations (and guidelines)

A platform to be developed by the ECIBC that will collect existing evidence-based guidelines and recommendations for breast cancer services.

(Source: Concept document – https://ec.europa.eu/jrc/sites/default/files/ecibc_concept_document.pdf)

EUSurvey

EUSurvey is the EC's multilingual online survey management system built for the creation and publication of surveys and public consultations.

(Source: <https://ec.europa.eu/eusurvey>)

Functional and non-functional requirements

Functional requirements are the product capabilities, or things the product must do for its users.

Non-functional requirements are the quality attributes, design and implementation constraints, and external interfaces that the product must have.

(Source: IIBA website: <http://www.iiba.org/>)

Guideline item

A guideline item is a relevant question and its related recommendation. When possible, it will be formulated according to the PICO framework. Guideline items can be an element of the *New European Guidelines* or an element of the European platform of recommendations (and guidelines).

(Source: Concept document – https://ec.europa.eu/jrc/sites/default/files/ecibc_concept_document.pdf)

New European Guidelines

The new '*European guidelines for breast cancer screening and diagnosis*' to be developed within ECIBC under JRC coordination.

The previous version was published in four editions from the early 1990s to 2006 by groups of experts originally established under the Europe Against Cancer programme.

(Source: Concept document – https://ec.europa.eu/jrc/sites/default/files/ecibc_concept_document.pdf)

Open source software (OSS)

OSS is computer software with its source code made available with a license in which the copyright holder provides the rights to study, change, and distribute the software to anyone and for any purpose. Open source software may be developed in a collaborative public manner.

The open source model, or collaborative competition development from multiple independent sources, generates an increasingly diverse scope of design perspective than one company development alone can sustain long term.

(Source: Wikipedia)

PICO process

PICO stands for Patient or Problem, Intervention (a cause, prognostic factor, treatment, etc.), Comparison intervention, and Outcomes. One of the fundamental skills required for practising evidence based medicine is the asking of well-built questions. Such questions need to be phrased in ways that direct the literature search to relevant and precise answers. One of the benefits of a well-built question-forming is that the search for evidence is easier. The well-formed question makes it relatively straightforward to elicit and combine the appropriate terms needed to represent the need for information in the query language of whichever searching service is available.

(Source: <http://www.cebm.net/asking-focused-questions/>)

Portlet

Portlets are user interface software components that are managed and displayed in a web portal, easy to add or remove from web pages.

Portlets produce fragments of code that are aggregated into a portal. Typically, following the desktop metaphor, a portal page is displayed as a collection of non-overlapping portlet windows, where each portlet window displays a portlet. Hence a portlet (or collection of portlets) resembles a web-based application that is hosted in a portal.

Portlet standards are intended to enable software developers to create portlets that can be plugged into any portal supporting the standards.

(Source: Wikipedia)

Responsive web design

Responsive web design is an approach to web design aimed at crafting sites to provide an optimal viewing experience—easy reading and navigation with a minimum of resizing, panning, and scrolling—across a wide range of devices (from desktop computer monitors to mobile phones).

(Source: Wikipedia)

Solution requirement

A characteristic of a solution that meets the business and stakeholder requirements. May be subdivided into functional and non-functional requirements.

(Source: IIBA website: <http://www.iiba.org/>)

Stages of breast cancer care

These stages imply the steps of cancer care which a patient goes through in the pathway of cancer care. In ECIBC, breast cancer care is divided into five stages:

- Screening.
- Diagnosis.
- Treatment.
- Rehabilitation.
- Follow-up.

These stages should be distinguished from clinical breast cancer stages defining the extent of disease which are usually expressed in numbers 0 through 4.

(Source: Concept document—https://ec.europa.eu/jrc/sites/default/files/ecibc_concept_document.pdf)

Stakeholder requirement

Stakeholder requirements are statements of the needs of a particular stakeholder or class of stakeholders. They describe the needs that a given stakeholder has and how that stakeholder will interact with a solution. Stakeholder requirements serve as a bridge between business requirements and the various categories of solution requirements.

(Source: IIBA website: <http://www.iiba.org/>)

Wireframe (websites)

A website wireframe is a visual guide that represents the skeletal framework of a website. The purpose is usually being informed by a business objective and a creative idea. The wireframe depicts the page layout or arrangement of the website content, including interface elements and navigational systems, and how they work together. The wireframe usually lacks typographic style, colour, or graphics, since the main focus lies in functionality, behaviour, and priority of content. Wireframes can be pencil drawings or sketches on a whiteboard, or they can be produced by means of a broad array of free or commercial software applications. Wireframes are generally created by business analysts, user experience designers, developers, visual designers and other roles with expertise in interaction design, information architecture and user research.

(Source: Wikipedia)

Work breakdown structure (WBS)

A division of a project into tasks and subtasks. The tasks are numbered to indicate their relationship to each other. WBSs are indispensable for project planning, particularly when estimating time and resource requirements. Some industries use established work breakdown structure systems for billing and reporting purposes.

(Source: *The Free On-line Dictionary of Computing*. Retrieved July 15, 2015, from Dictionary.com website: [http://dictionary.reference.com/browse/work breakdown structure](http://dictionary.reference.com/browse/work+breakdown+structure))

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